Journal of Physics: Conference Series 2011 vol.324 N1

Inhomogeneous broadening of ESR lines of rare earth impurities in scheelite CaWO 4 induced by internal electric field gradients

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Abstract

The inhomogeneous broadening of ESR line in erbium-doped CaWO 4 crystal is studied both theoretically and experimentally in the special case when external magnetic field is parallel to crystal c axis. Lorenzian shapes of ESR lines are observed and ascribed to the broadening from random electric field gradients produced by charged defects. The defect concentrations are estimated on the grounds of a simple statistical model and crystal-field calculations of impurity-defect coupling constants. Samples with different concentrations of erbium ions are used in order to find out how Er 3+ impurities affect the linewidth.

http://dx.doi.org/10.1088/1742-6596/324/1/012009